

AMENDMENTS TO THE DRAWINGS:

Subject to the approval of the Examiner, Applicants have amended Fig. 1 and Fig. 2 to add the labels "Prior Art." These changes are indicated in the attached drawing Replacement Sheets and are marked in red on the attached Annotated Sheets.

REMARKS

In the non-final Office Action mailed on July 10, 2006, the Examiner objected to claims 8-11 as being informal; rejected claims 1-7 and 12-17 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,453,727 to *Shibasaki et al.* ("*Shibasaki*"); and rejected claims 8-11 under 35 U.S.C. 103(a) as being unpatentable over *Shibasaki* in view of U.S. Patent No. 5,883,564 to *Partin*.

By this Amendment, Applicants have amended claims 1, 8 and 13 and cancelled claim 12. Support for the changes to claim 1 may be found in the specification at, for example, page 22, line 27 to page 23, line 4; and page 25, line 24 to page 26, line 22. Support for the changes to claim 8 may be found in the specification at, for example, page 28, line 16 to page 29, line 4.

Claims 1-11 and 13-30 are pending, of which claims 1-11 and 13-17 are under current examination, and claims 18-30 are withdrawn from consideration.

Subject to the Examiner's approval, Applicants propose to amend Fig. 1 and Fig. 2 by labeling these figures "Prior Art" as indicated in the attached drawing Replacement Sheets and shown in red on the attached Annotated Sheets.

Claim Objection

The Examiner objected to claims 8-11 for lacking antecedent basis for the claim term "the contact surface" recited in claim 8. Amended claim 8 does not recite "the contact surface." Accordingly, the objection of claim 8 is moot. Applicants respectfully

request that the Examiner withdraw the objection to claim 8, as well as claim 9-11 that depend from claim 8.

Rejection Under 35 U.S.C § 102(b)

Applicants traverse the rejection of claims 1-7 and 12-17 under 35 U.S.C. § 102(b) as being anticipated by *Shibasaki*. In order for *Shibasaki* to anticipate Applicants' claimed invention under Section 102(b), each and every element of each claim in issue must be found, either expressly described or under principles of inherency, in the reference. Further, "[t]he identical invention must be shown in as complete detail as is contained in the . . . claim." (See M.P.E.P. § 2131, quoting *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989).) *Shibasaki* cannot anticipate Applicants' independent claim 1 because the reference fails to teach, at least, a compound semiconductor stacked structure having "active layer ... thicker than 30 nm and thinner than 100 nm" or "lattice constant differences between said active layer and said first and second compound semiconductor layers are set within a range of 0.1% to 1.0%" (emphasis added).

In the Office Action, the Examiner asserts that *Shibasaki* discloses "a lattice constant that is within 2 percent of the active sensor layer." (Office Action, p. 3, para. 8, citing *Shibasaki*, col. 5, lines 50-55.) To be specific, *Shibasaki* discloses "the difference between the lattice constant of the compound semiconductor and that of the crystal of the sensor layer should be within ±5% and more preferably within ±2%." (*Shibasaki*, col. 5, lines 50-56, emphasis added.) However, *Shibasaki* does not disclose the above-

noted features of amended claim 1 with sufficient specificity to anticipate the claimed ranges. M.P.E.P. § 2131.03(II) states:

When the prior art discloses a range which touches, overlaps or is within the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with "sufficient specificity to constitute an anticipation under the statute."

In this case, the $\pm 2\%$ range disclosed by *Shibasaki* substantially exceeds the claimed range of 0.1% to 1.0%. *Shibasaki* also does not disclose a lower range of 0.1%. Accordingly, *Shibasaki* fails to disclose "a range of 0.1% to 1.0%" with sufficient specificity to anticipate this feature of claim 1.

In addition, the Examiner asserts that *Shibasaki* discloses "[s]aid active layer is less than 0.1 micrometers." (Office Action p. 3, para. 8, citing *Shibasaki*, col. 4:45-50.) Thus, at most, *Shibasaki* discloses a range of 0.00 to 0.10 micrometers. However, *Shibasaki* does not disclose a lower range of "0.03 micrometers," as recited in claim 1. Accordingly, *Shibasaki* fails to disclose the claimed "range of 30 nm and thinner than 100 nm," with sufficient specificity to anticipate claim 1.

Since *Shibasaki* fails to anticipate the above-noted features of claim 1, *Shibaki* cannot support a rejection of claim 1 under 35 U.S.C. § 102(b). Accordingly, claim 1 is allowable over *Shibasaki*.

Furthermore, Applicants advise that it is difficult for a conventional quantum well compound stacked semiconductor to achieve electron mobility and sheet resistance with good reproducibility because controlling Sb included in the first and second compound semiconductor layers is always difficult. (See specification, p. 24:18-26.)

Conventionally, the thickness of a sensor layer, such as InAs, is preferably 20 nm or less to form a Hall sensor having a quantum effect. (Specification at p. 25:4-5.) In contrast, claim 1 recites an "active layer ... thicker than 30 nm and thinner than 100 nm" and "lattice constant differences between said active layer and said first and second compound semiconductor layers are set within a range of 0.1% to 1.0%." Based on the claimed relationships, variations in characteristics such as electron mobility and sheet resistance can be very small because of the composition variations in Sb in the first and second compound semiconductor layers.

According to the study of the example 1 and comparative example 1 in Applicants' specification (see pp. 44 to 47, and Table 3), when the thickness of a conventional active layer is 15 nm, the composition variations of first and second compound semiconductor layers are set within a range of lattice constant differences 0.14% to 0.97%; the electron mobility variations are in the average range of $\pm 32\%$, and the sheet resistance variations are in the average range of $\pm 82\%$. These variations are very large. In contrast, according to the example 1 of the present invention (see specification, Table 2), when the thickness of conventional active layer is 50 nm, the composition variations of first and second compound semiconductor layers are set within a range of lattice constant differences 0.10% to 0.99%, the electron mobility variations are in the average range of $\pm 9\%$ and the sheet resistance variations are in the average range of $\pm 31\%$. These variations are comparatively very small. Thus, the present invention solves the conventional problems that, if the lattice constants of the first and second compound semiconductor layers are too large or too small with respect to the lattice constant of the active layer, the characteristics such as electron mobility

can vary greatly because of the composition variations in Sb in the first and second compound semiconductor layers. (See Specification, p. 23:10-16.)

Consistent with the disclosure in the specification, the compound stacked semiconductor recited in claim 1 provides that lattice constant differences between an active layer and first and second compound semiconductor layers are set within a range of 0.1% to 1.0% and active layer is thicker than 30 nm and thinner than 100 nm. Therefore, the variations in the characteristics such as electron mobility and sheet resistance may be vary small because of the composition variations in Sb in the first and second compound semiconductor layers.

Claims 3-7 depend from claim 1 and, therefore, include all the limitations of claim 1. Thus, for the same reasons provided above for claim 1, claims 3-7 are also allowable over *Shibasaki*.

Claim 12 is cancelled by this Amendment. Accordingly, the rejection of claim 12 under 35 U.S.C. § 102(b) is moot.

Claim 13 is amended to depend from independent claim 8 and, therefore, includes all the features recited in claim 8. Claim 8 was rejected under by the Examiner under 35 U.S.C. § 103(a). Accordingly, the rejection of claim 13 under Section 102(b) is also moot.

Rejection Under 35 U.S.C § 103(a)

Applicants traverse the rejection of claims 8-11 under 35 U.S.C. 103(a) as being unpatentable over *Shibasaki* in view of *Partin*. (Office Action, p. 8.) In order to establish

a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art references must teach or suggest all the claim elements. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify a reference or to combine reference teachings. Third, there must be a reasonable expectation of success. See M.P.E.P. § 2143. Here, the cited references cannot establish a *prima facie* case of obviousness because, among other things, neither the *Shibasaki* nor *Partin*, taken alone or in any proper combination, teach or suggest each and every feature recited in Applicants' claims.

Independent claim 8, as amended recites "a passivation covered directly a top surface and side surfaces of said semiconductor thin film other than a part of said active layer, and a metal electrode layer formed on said passivation and the part on said active layer, electrically isolated from said semiconductor thin films by said passivation, and makes contact with the semiconductor thin films only with said active layer." *Shibasaki* is silent with regard to these features.

The Examiner cites *Partin* for the reference's alleged disclosure of "electrodes (16) are deposited and patterned such that they only contact the active layer." Although Applicants do not necessarily agree with the Examiner's allegation, Applicants advise that *Partin* also fails to disclose the above-noted features of claim 8.

Accordingly, because *Shibasaki* and *Partin* fail to disclose or suggest the "passivation" recited in claim 8, these references, whether taken alone or in combination, cannot support a *prima facie* case for the rejection of claim 8 under 35

U.S.C. § 103(a). Applicants, therefore, respectfully request that the Examiner allow the claim 8, as well as claims 9-11 and 13, which are also allowable at least due to their dependence from allowable claim 8.

CONCLUSION

In view of the foregoing remarks, Applicants respectfully submit that the objection and rejections detailed above should be withdrawn. Applicants, therefore, submit that pending claims 1 and 3-17 are in condition for allowance, and request a favorable action.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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By: 

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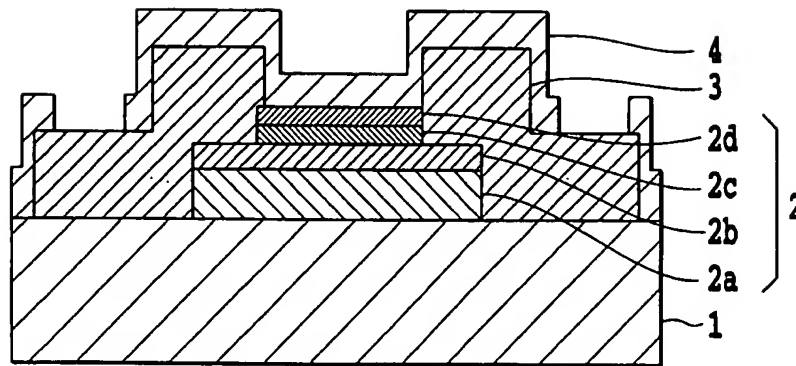


FIG.1
(PRIOR ART)

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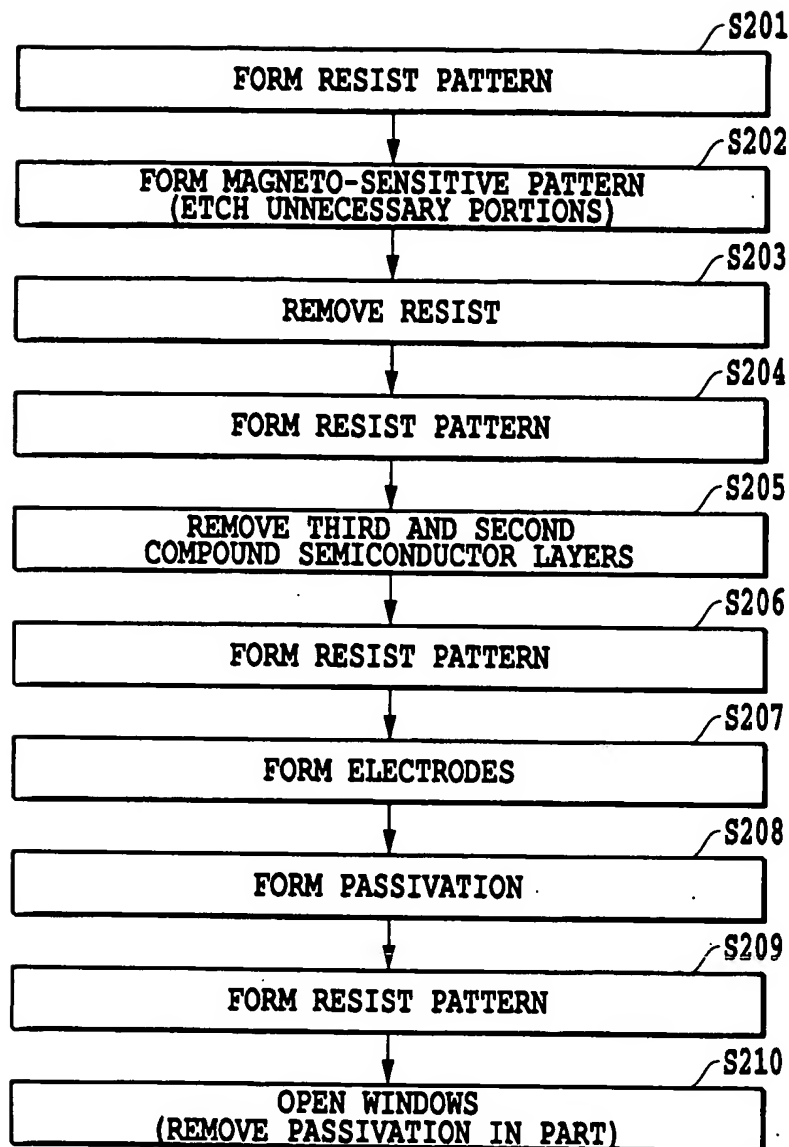


FIG.2
(PRIOR ART)